

Department of Transportation
Office of the Secretary
Washington, D.C.

ORDER

DOT 5000.1

6-30-72

SUBJECT: DISCOUNT RATES TO BE USED IN EVALUATING TIME-DISTRIBUTED COSTS AND BENEFITS

1. PURPOSE. This Order implements the regulations promulgated in Office of Management and Budget (OMB) Circular No. A-94 (Revised). The intent is to state explicitly the discount rates to be used in evaluating the measurable costs and benefits of programs or projects when they are distributed over time.
2. SCOPE. This Order applies to the Office of the Secretary (OST) and the operating administrations. In addition, pursuant to delegation by the National Transportation Safety Board (NTSB) under Section 5(m) of the Department of Transportation (DOT) Act, this order applies to the NTSB.
3. BACKGROUND. The OMB has revised Circular A-94 for three primary reasons:
 - a. To eliminate confusion between Circulars A-94 and A-76. The former is to be used when making decisions about the initiation of programs or projects, while the latter is to be used when making lease versus purchase decisions about a program or project that has already been initiated.
 - b. To continue the requirement for estimating annual program effects or outputs but eliminate the requirement for discounting these effects.
 - c. To state more explicitly the conditions under which the 10% discount rate should be used.
4. ACTION. All Secretarial Offices, all operating administrations and the National Transportation Safety Board will implement OMB Circular A-94 (Attachment 1).

FOR THE SECRETARY OF TRANSPORTATION:



William S. Heffelfinger
Assistant Secretary
Administration

DISTRIBUTION: All Secretarial Offices
All Operating Administrations
National Transportation Safety
Board

OPI: Office of Planning
and Program Review

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

March 27, 1972

CIRCULAR NO. A-94
Revised

TO THE HEADS OF EXECUTIVE DEPARTMENTS AND ESTABLISHMENTS

SUBJECT: Discount rates to be used in evaluating time-
distributed costs and benefits

1. Purpose. This Circular prescribes a standard discount rate to be used in evaluating the measurable costs and/or benefits of programs or projects when they are distributed over time.

2. Rescission. This Circular replaces and rescinds Office of Management and Budget (OMB) Circular No. A-94 dated June 26, 1969.

3. Scope.

a. This Circular applies to all agencies of the executive branch of the Federal Government except the U.S. Postal Service. The discount rate prescribed in this Circular applies to the evaluation of Government decisions concerning the initiation, renewal or expansion of all programs or projects, other than those specifically exempted below, for which the adoption is expected to commit the Government to a series of measurable costs extending over three or more years or which result in a series of benefits that extend three or more years beyond the inception date.

b. Specifically exempted from the scope of this Circular are decisions concerning water resource projects (guidance for which is the approved Water Resources Principles and Standards), the Government of the District of Columbia, and non-Federal recipients of Federal loans or grants.

c. The remaining exemptions derive from the secondary nature of the decisions involved; that is, how to acquire assets or proceed with a program after an affirmative decision to initiate, renew, or expand such a program using this Circular. Thus:

(1) This Circular would not apply to the evaluation of decisions concerning how to obtain the use of real property, such as by lease or purchase.

(No. A-94)

2

(2) This Circular would not apply to the evaluation of decisions concerning the acquisition of commercial-type services by Government or contractor operation, guidance for which is OMB Circular No. A-76.

(3) This Circular would not apply to the evaluation of decisions concerning how to select automatic data processing equipment, guidance for which is OMB Circular No. A-54 and OMB Bulletin No. 60-6.

d. The discount rates prescribed in this Circular are:

(1) Suggested for use in the internal planning documents of the agencies in the executive branch;

(2) Required for use in program analyses submitted to the Office of Management and Budget in support of legislative and budget programs.

This Circular does not supersede agency practices which are prescribed by or pursuant to law, Executive order, or other relevant Circulars. Agencies should evaluate their programs and projects in accordance with existing requirements and, in addition, summarize the present value costs and/or benefits using the discount rate prescribed in this Circular.

4. Definitions. Analytic documents submitted to the Office of Management and Budget should be based on the following concepts where relevant:

a. Expected annual cost means the expected annual dollar value (in constant dollars) of resources, goods, and services required to establish and carry out a program or project. Estimates of expected yearly costs will be based on established definitions and practices for program and project evaluation. However, all economic costs, including acquisition, possession, and operation costs, must be included whether or not actually paid by the Federal Government. Such costs not generally involving a direct Federal payment include imputed market values of public property and State and local property taxes foregone.

b. Expected annual benefit means the dollar value (in constant dollars) of goods and services expected to result from a program or project for each of the years it is in operation. Estimates of expected yearly benefits will be based on established definitions and practices developed by agencies for program and project evaluation.

(No. A-94)

c. Expected annual effects means an objective, non-monetary measure of program effects expected for each of the years a program or project is in operation. When dollar value cannot be placed on the effects of comparable programs or projects, an objective measure of effects may be available and useful to enable the comparison of alternative means of achieving specified objectives on the basis of their relative present value costs. These effects should be estimated for each year of the planning period and are not to be discounted.

d. Discount rate means the interest rate used in calculating the present value of expected yearly costs and benefits.

e. Discount factor means the factor for any specific discount rate which translates expected cost or benefit in any specific future year into its present value. The discount factor is equal to $1/(1+r)^t$, where r is the discount rate and t is the number of years since the date of initiation, renewal or expansion of a program or project.

f. Present value cost means each year's expected yearly cost multiplied by its discount factor and then summed over all years of the planning period.

g. Present value benefit means each year's expected yearly benefit multiplied by its discount factor and then summed over all years of the planning period.

h. Present value net benefit means the difference between present value benefit (item g) and present value cost (item f).

i. Benefit-cost ratio means present value benefit (item g) divided by present value cost (item f).

Attachment A contains an example that illustrates calculation of the present value information.

5. Treatment of inflation. All estimates of the costs and benefits for each year of the planning period should be made in constant dollars; i.e., in terms of the general purchasing power of the dollar at the time of decision. Estimates may reflect changes in the relative prices of cost and/or benefit components, where there is a reasonable basis for estimating such changes, but should not include any forecasted change in the general price level during the planning period.

6. Treatment of uncertainty. Actual costs and benefits in future years are likely to differ from those expected at the time of decision. For those cases for which there is a reasonable basis to estimate the variability of future costs and benefits, the sensitivity of proposed programs and projects to this variability should be evaluated.

The expected annual costs and benefits (or effects) should be supplemented with estimates of minimum and maximum values. Present value cost and benefits should be calculated for each of these estimates. The probability that each of the possible cost and benefit estimates may be realized should also be discussed, even when there is no basis for a precise quantitative estimate. Uncertainty of the cost and benefit (or effects) estimates should be treated explicitly, as described above. The prescribed discount rate should be used to evaluate all alternatives. Specifically, the evaluations should not use different discount rates to reflect the relative uncertainty of the alternatives.

7. Discount rate policy. The discount rates to be used for evaluations of programs and projects subject to the guidance of this Circular are as follows:

- a. A rate of 10 percent; and, where relevant,
- b. Any other rate prescribed by or pursuant to law, Executive order, or other relevant Circulars.

The prescribed discount rate of 10 percent represents an estimate of the average rate of return on private investment, before taxes and after inflation.

To assist in calculation, Attachment B contains discount factors for the discount rate of 10.0 percent for each of the years from one to fifty.

8. Interpretation. Questions concerning interpretation of this Circular should be addressed to the Assistant Director for Evaluation, Office of Management and Budget (395-3614).

GEORGE P. SHULTZ
DIRECTOR

Attachments

(No. A-94)

ATTACHMENT A
Circular No. A-94
Revised

SAMPLE FORMAT FOR DISCOUNTING DEFERRED COSTS AND BENEFITS

Assume a ten-year program which will commit the Government to the stream of expenditures appearing in column (2) of the table below and which will result in a series of benefits appearing in column (3). The discount factor for a 10 percent discount rate is presented in column (4). Present value cost for each of the ten years is calculated by multiplying column (2) by column (4); present value benefit for each of the ten years is calculated by multiplying column (3) by column (4). Present value costs and benefits are presented in columns (5) and (6), respectively.

Year since initiation, renewal or expansion	Expected yearly cost	Expected yearly benefit	Discount factor for 10 percent	Present value cost [Col. (2) x Col. (4)]	Present value benefit [Col. (3) x Col. (4)]
(1)	(2)	(3)	(4)	(5)	(6)
1	\$10	\$0	0.909	\$9.1	\$0.0
2	20	0	0.826	16.5	0.0
3	30	5	0.751	22.5	3.8
4	30	10	0.683	20.5	6.8
5	20	30	0.621	12.4	18.6
6	10	40	0.564	5.6	22.6
7	5	40	0.513	2.6	20.5
8	5	40	0.467	2.3	18.7
9	5	40	0.424	2.1	17.0
10	5	25	0.386	1.9	9.7
				<u>\$95.5</u>	<u>\$117.7</u>

The sum of column (5) is present value cost: \$95.5
The sum of column (6) is present value benefit: \$117.7

Present value net benefit is the difference between present value total benefit and present value total cost:
\$117.7 - \$95.5 = \$22.2.

The benefit-cost ratio is $117.7/95.5 = 1.23$.

NOTE: For more difficult discounting problems, a recommended reference is Principles of Engineering Economy, by Eugene L. Grant and W. G. Ireson, Ronald Press Company, 1960.

ATTACHMENT B
Circular No A-94
Revised

DISCOUNT FACTORS

<u>Year since initiation renewal or expansion</u>	<u>Discount factors*</u>	<u>Year since initiation, renewal or expansion</u>	<u>Discount factors*</u>
1	0.909091	26	0.083905
2	0.826446	27	0.076278
3	0.751315	28	0.069343
4	0.683013	29	0.063039
5	0.620921	30	0.057309
6	0.564474	31	0.052099
7	0.513158	32	0.047362
8	0.466507	33	0.043057
9	0.424098	34	0.039143
10	0.385543	35	0.035584
11	0.350494	36	0.032349
12	0.318631	37	0.029408
13	0.289664	38	0.026735
14	0.263331	39	0.024304
15	0.239392	40	0.022095
16	0.217629	41	0.020086
17	0.197845	42	0.018260
18	0.179859	43	0.016600
19	0.163508	44	0.015091
20	0.148644	45	0.013719
21	0.135131	46	0.012472
22	0.122846	47	0.011338
23	0.111678	48	0.010307
24	0.101526	49	0.009370
25	0.092296	50	0.008519

*The discount factors presented in the table above implicitly assume end-of-year lump-sum costs and returns. When costs and returns occur in a steady stream, applying mid-year discount factors may be more appropriate. Present value cost and benefit computed from this table can be converted to a mid-year discounting basis by multiplying them by the factor 1.048809.

For example, if the present value cost of a series of annual expenditures computed from the above table is \$1,200.00, the present value cost on a mid-year discounting basis is \$1,200.00 x 1.048809 or \$1,258.57.